KITIMAT - SKEENA
287 kV TRANSMISSION LINE PROJECT

RECREATION AND VISUAL ASSESSMENT

Final Report

March 1990

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Project No. 89788

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EXECUTIVE SUMMARY

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The B.C. Hydro and Power Authority has developed a network of electrical generating stations and transmission lines throughout the province of British Columbia. The existing transmission syst from Kitimat to Terrace is part of this network.

As a result of an agreement to purchase power from Alcan (the Aluminum Company of Canada), there is a need to reinforce this transmission system. B.C. Hydro proposes to construct a second 287kV transmission line from Kitimat to Terrace, a distance of approximately 60 km. The route to be used for the new line has r been determined.

This visual and recreation resources assessment is part of a seri of multidisciplinary environmental studies directed towards identifying the optimum location for the new line.

Two route alternatives, each with several alignment options, were evaluated in terms of their potential impacts on visual and recreation resources of the corridor and adjacent areas. In this assessment, the corridor is defined as the transmission line and the cleared zone within which it is located.

From a visual and recreation perspective, Route A is preferred. The combination of segments with the least impacts is:

11-10 or 12-10
10-9-8
8-7
7-4-3-2-1

Concentration of utilities in the existing corridor means that th west side of the valley will remain a comparatively untouched landscape, offering more potential opportunities for contrasting experiences as the valley as whole develops.

Route A will have more impacts on more highly used visual and recreation resources than Route B. It runs along the more developed side of the valley where existing land uses are concentrated and is immediately adjacent to Highway 25 for much o its length. However, the impacts will be incremental since it wi parallel an existing utility corridor for much of its length.

Route B requires development of a new corridor in a relatively undisturbed landscape.

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Table of Contents

1. INTRODUCTION .....

   1.1 Purpose of Project .....
   1.2 Objectives of Study .....

2. METHODOLOGY .....

3. PROJECT DESCRIPTION .....

   3.1 Proposed Routes .....
   3.2 Towers and Conductors .....
   3.3 Corridor Clearing .....

4. VISUAL/RECREATION IMPACTS & IMPACT MANAGEMENT STRATEGIES ...

   4.1 Preferred Route .....
   4.2 Route AB .....
   4.2.1 Visual and Recreation Impacts .....
   4.3 Route A .....
   4.3.1 Visual and Recreation Impacts .....
   4.3.2 Preferred Route Segments .....
   4.4 Route B .....
   4.4.1 Visual and Recreation Impacts .....
   4.4.2 Preferred Route Segments .....

5. APPENDICES

   Appendix 1: References .....
   Appendix 2: Persons Contacted .....
   Appendix 3: Visual Management Concepts .....
   Appendix 4: Glossary of Terms .....
   Appendix 5: Route Map .....(in map pocket)

LIST OF TABLES

1. Corridor types and clearing widths for the proposed Kitimat-Skeena 287kV transmission line .....
2. Visual and Recreation impacts and impact management strategies: Route AB .....
3. Visual and Recreation impacts and impact management strategies: Route A. .....
4. Visual and Recreation impacts and impact management strategies: Route B .....

LIST OF FIGURES

1. Study Area .....
2. Type 1 Corridor: transmission line in separate corridor .....
3. Type 2 Corridor: transmission line adjacent to existing 287kV circuit .....
4. Type 3 Corridor: transmission line parallel to existing 287kV circuit with gas pipeline between .....
5. Existing 287kV line .....

Route AB

6. Km 1 Anderson Creek .....
7. Km 2 Eurocan .....
8. Km 3 Eurocan .....
9. Km 2 Eurocan .....
10. Km 5 Kitimat Station .....
11. Km 8 Clague Mountain Area .....

Route A

12. Km 16 Kitimat Valley .....
13. Km 16 Kitimat Valley .....
14. Km 26 Humphreys Creek .....
15. Km 28 Humphreys Creek .....
16. Km 29 Humphreys Creek .....
17. Km 32 Kitimat Crossing .....
18. Km 33 Kitimat Crossing .....
19 Km 32 Kitimat Crossing .....
20. Km 35 Onion Flats .....

21. Km 35 Onion Flats .....
22. Km 44 Mt. Layton .....
23. Km 44 Mt. Layton .....
24. Km 44 Mt. Layton .....
25. Km 47 Hatchery Cr. .....
26. Km 47 Hatchery Cr. .....
27. Km 46 Hatchery Cr. .....
28. Km 46 Hatchery Cr. .....
29. Km 46 Hatchery Cr. .....
30. Km 49 Furlong Cr. .....
31. Km 50 Furlong Cr. .....
32 Km 50 Furlong Cr. .....
33. Km 54 Sockeye Cr. .....
34. Km 55 Sockeye Cr. .....
35. Km 59 Thunderbird Flats .....

Route B

36. Km 15 Little Wedeene .....
37. Km 15 Little Wedeene .....
38. Km 18 Wedeene Area .....
39. Km 21 Wedeene R. .....
40. Km 27 Wedeene R. .....
41. Km 22 Wedeene R. .....
42. Km 22 Wedeene R. .....
43. Km 28 Lone Wolf Cr. .....
44. Km 37 Coldwater R. .....
45. Km 41 .....
46. Km 42 .....
47. Km 51 Skeena Substation .....

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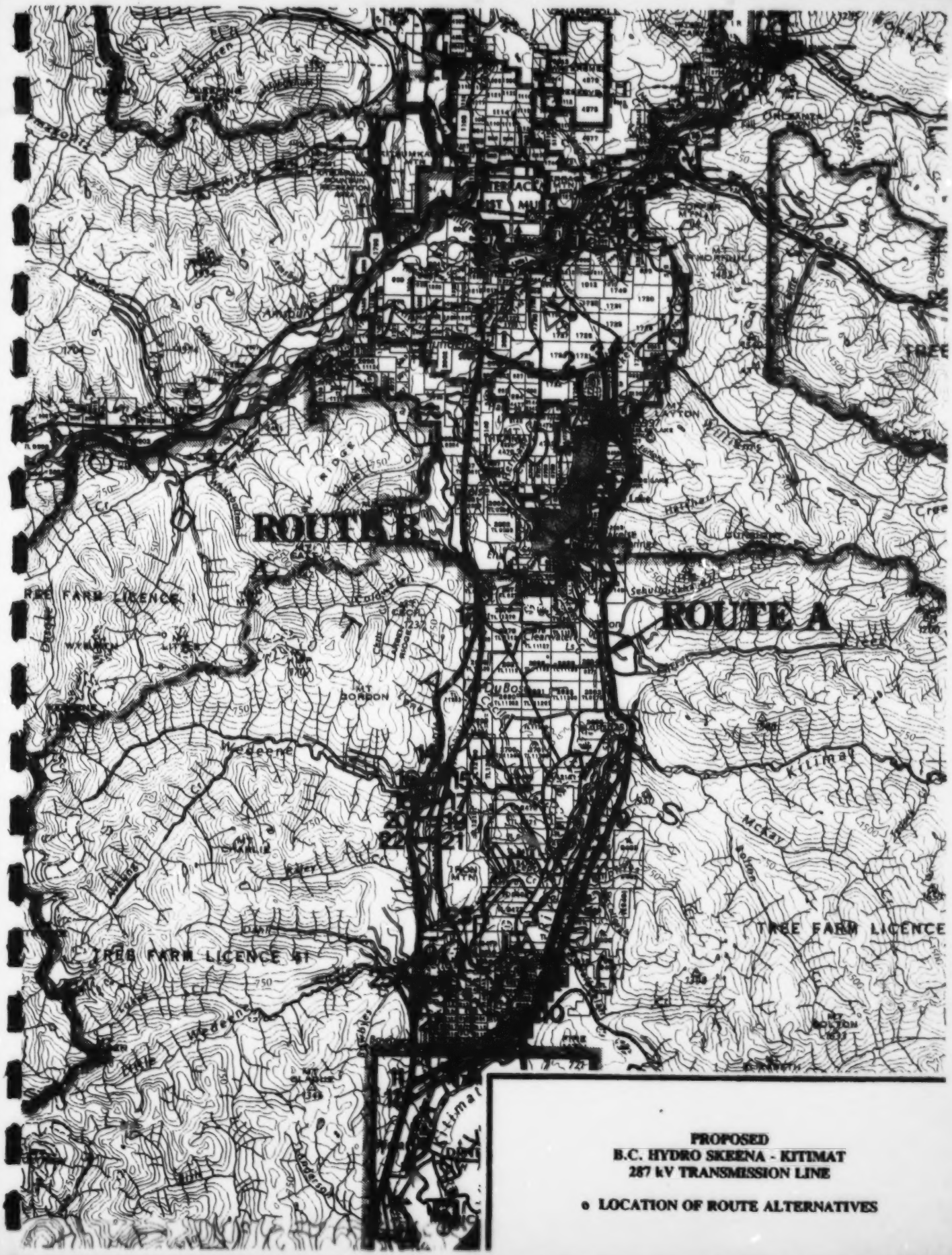
1. *Introduction*

1.1 PURPOSE OF PROJECT

The B.C. Hydro and Power Authority has developed a network of electrical generating stations and transmission lines throughout the province of British Columbia. The existing transmission syst from Kitimat to Terrace is part of this network. It consists of single circuit, 287kV transmission line (circuit 2L99) between Kitimat Substation near Kitimat and Skeena Substation near Terrac

As a result of an agreement to purchase power from Alcan (Aluminu Company of Canada), there is a need to reinforce this transmissio system. B.C. Hydro proposes to construct a second 287kV line between these two substations, a distance of approximately 60 km, depending on the route selected. The line would be known as circuit 2L104.

The route to be used for the new transmission line has not been determined. Figure 1 illustrates the general location of two possible routes, referred to as A and B, as well as possible alignment alternatives within them.


ROUTE B
ROUTE A
TREE FARM LICENCE 1
TREE FARM LICENCE 41
TREE FARM LICENCE
Terrace
Kitimat
Thornhill
Mt. Layton
Mt. Gordon
Mt. Clifton
Mt. Bolton
Mt. Wedeene
Mt. Sparlin
Mt. Dudley
Mt. Williams
Mt. Hankin
Mt. Hankin
Mt. Anderson
Mt. Mckay
Kalum
Skeena
Wedeene
Kitimat
Lakelse
Lakelse
Lakelse

1.2 OBJECTIVES OF STUDY

The purpose of the Recreation and Visual Resources Assessment is to evaluate the potential impacts of the proposed transmission line route alternatives on visual and recreation resources of the corridor and immediately adjacent areas.

The specific objectives of this study are:

1. to conduct a reconnaissance level survey to identify sensitive areas;
2. to conduct site-specific evaluations of more sensitive locations;
3. to provide input into evaluation of route alternatives.

Chapter 2 of this report briefly describes the study methodology.

Chapter 3 describes the characteristics of the proposed transmission line.

Chapter 4 presents detailed descriptions of each section of the alternative routes. Photographs are used to illustrate key sections of each route.

Chapter 5, Appendices, includes a map of the study area as well as references, contacts and a glossary of terms.

The study was conducted by Bruce Haggerstone of DURANTE & PARTNERS Vancouver, during the fall and winter of 1989-1990. Overall project guidance was provided by Mark Walmsley of Westland Resource Group, Victoria.

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2. *Methodology*

Recreation and visual impacts are discussed together in this stud since the visual experience of place is a major part of many recreational activities.

Assessment of visual and recreation impacts was based on:

1. reconnaissance aerial assessment of three proposed routes;
2. identification of viewsheds and distance zones;
3. discussions with key individuals and agencies;
4. detailed, site specific evaluation using topographic maps, aerial photographs and field investigations.

The methodology is similar to that used in the assessment of visu and recreation impacts of the Williston - Kelly Lake 500kV transmission line (Durante & Partners, 1990) and the Wingy Craggy mine access road (Norecol, 1990). It has been adapted from sever standard methods including those used by the B.C. Ministry of Forests (1981) and the B.C. Ministry of Environment (1983)(see Appendix 3).

Each section of the two routes was evaluated in terms of its overall visual/recreation sensitivity. This rating is a composit index based on numerous factors. These include:

- distance to proposed line (foreground, midground, background);
- types of viewers (residents, recreationists, travellers);
- numbers of viewers;
- viewer exposure (the length of time the line will be seen);
- observer position (above, below);
- the visual character and context of the landscape through which the line will be built;
- type and intensity of recreation activity.

A three point scale was used to rate each segment of each route i terms of the sensitivity of visual and recreation resources to transmission line development:

HIGH Sensitivity	- large numbers of viewers (e.g. along highway 25); - highly visible foreground views - unobstructed views at close range (e. crossings of roads or rivers); - prominent visual location (eg steep sidehills or skyline ridges); - proximity to residences or recreation properties (e.g. above Lakelse Lake); - conflicts with high levels of existin recreation uses; - conflicts with areas of high recreati potential.
MEDIUM Sensitivity	- some observers; - midground views.
LOW Sensitivity	- few observers; - distant views; - not visible from most areas; - innaccessible or used and seen by ver few people.

A three point scale was then used to rate the probable levels of impact on visual and recreation resources.

The impact ratings assume that standard design and construction techniques will be employed. Implementation of mitigative measur could reduce the level of impact in some areas.

Some of the key concepts and terms used in describing visual and recreation impacts are listed in Appendices 3 and 4.

3. *Project Description*

3.1 Proposed Routes

Two alternative routes have been proposed, both of which follow a common route, Route AB, north from Kitimat Substation to just nor of Clague Mountain Municipal park. From that point, Route A crosses the Kitimat River valley and runs north along the base of the mountains to the Skeena Substation near Terrace.

Route B runs along the base of the mountains on the west side of the valley.

3.2 Towers and Conductors

For the purposes of this assessment, it has been assumed that the new 287kV transmission line will be similar to the existing line:

- wooden poles from 20 to 22 metres in height (Figures 2, 3, and 5) spaced from 200 to 250 metres apart, depending on numerous factors such as terrain.

3.3 Corridor Clearing

In this assessment, the corridor is defined as the transmission line and the cleared zone within which it will be located. There will be three types of corridor (Table 1), each having a differen cleared width, depending on whether the line will be by itself, parallel to the existing 287 kV circuit, or parallel to the existing 287kV circuit and gas pipeline (Figures 2, 3, and 4).

In many circumstances, the cleared corridor will be wider than th legal right of way (Table 1). Typical total cleared corridor widths will range from 70 to 140 metres, depending on corridor ty (these widths are the combined total of existing and proposed cleared corridors). They will be greater on sloping terrain sinc clearing widths are based on a number of factors including terrai slope.

Clearing goes beyond the legal right of way when it is necessary t remove "danger trees" that are tall enough that they could fall onto the conductors. Vegetation in these areas beyond the legal right of way will be allowed to grow but heights will be maintain so that trees do not get tall enough to fall onto the conductors.

Route AB will be in Type 2 and Type 1 corridors. More than 70% of this route will traverse steeply sloping sidehills so clearing widths will be greater than the typical 70 to 93 metres.

Route A will be on the east side of the valley near the existing 287kV line and will include all three corridor types. Total cleared corridor widths will range from 70 to 140 metres on flat ground. Sloping terrain, which accounts for about 15% of the route, will require greater clearing widths.

Route B, in a type 1 corridor on the west side of the valley, will require a typical flat ground clearing width of 70 metres (Figure 2). About 5 to 15% of this route will cross sloping sidehill terrain, depending on which of the numerous options is selected.

Corridor Type	Corridor Description	Additional Legal ROW Width (1) (m)	Typical Additional Clearing on flat ground (2) (m)	Typical Total Cleared Corridor on Flat ground (3) (m)	Applicab Routes AB	A
1	new circuit alone	32	38	70	x	x
2	parallel to existing 287kV line	16	19	93	x	x
3	parallel to existing 287kV and gas line	32	19	121-140		x

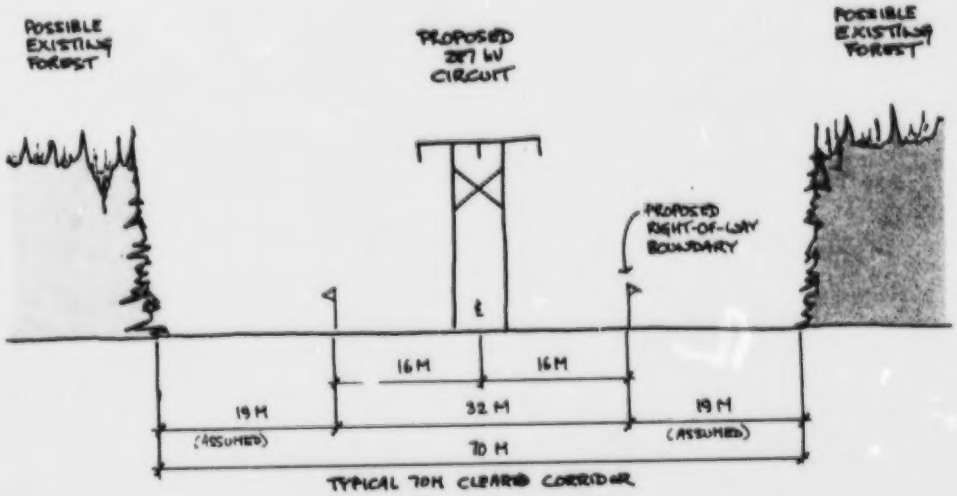
NOTES:

(1) From Kitimat-Skeena Project Description.

(2) These are typical additional clearing widths beyond the right-of-way boundary on flat ground, assuming 20m tree height. Widths will be greater where trees are taller and less where trees are shorter.

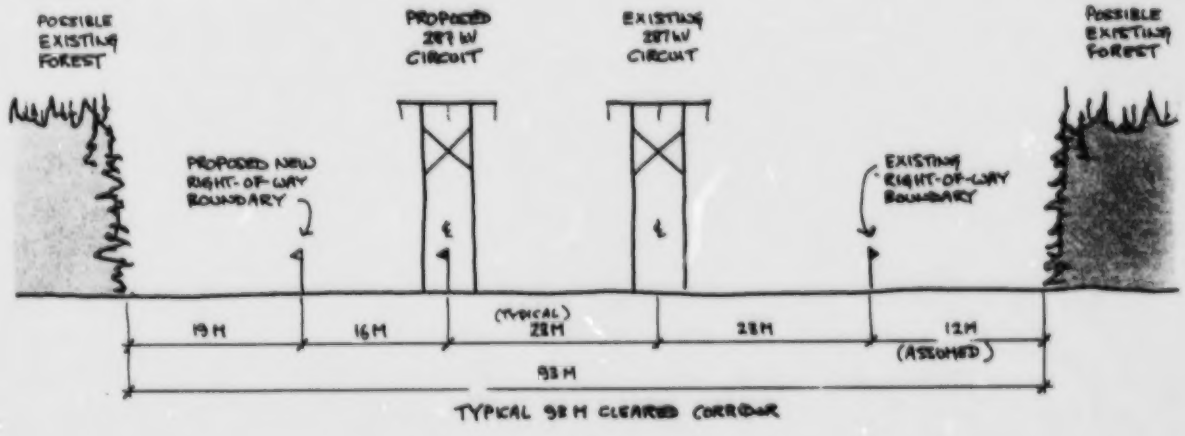
(3) Typical total cleared corridor consists of existing and proposed corridors combined.

Table 1: Corridor types and clearing widths for the proposed Kitimat-Skeena 287 kV transmission line



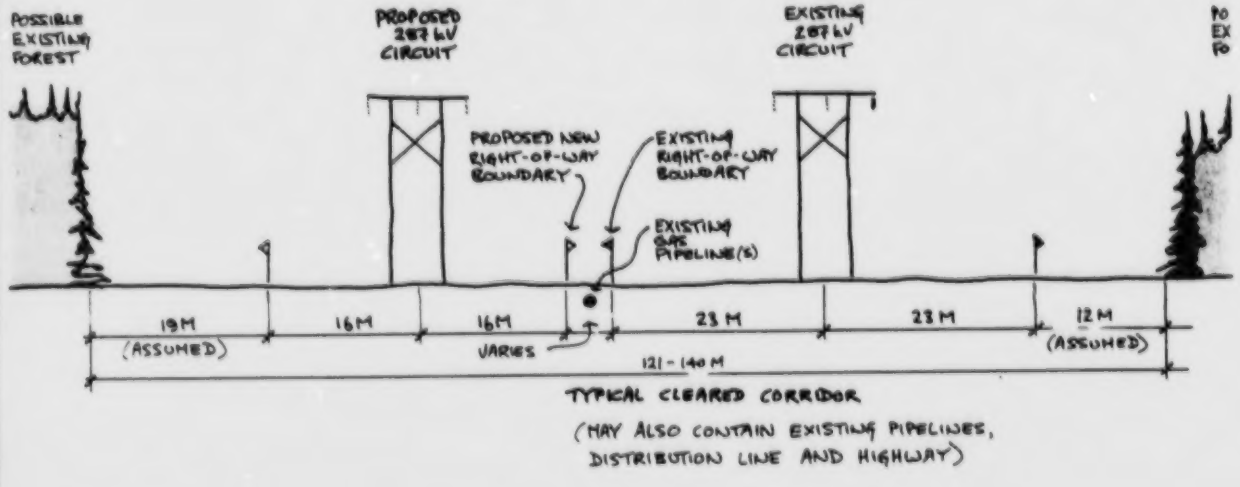
Kitimat - Skeena
287 kV Transmission Line Project
RECREATION AND VISUAL ASSESSMENT

Figure 2: Type 1 Corridor –
proposed line in separate corridor



Kitimat - Skeena
287 kV Transmission Line Project
RECREATION AND VISUAL ASSESSMENT

Figure 3: Type 2 Corridor – proposed line adjacent to existing 287 kV circuit



Kitimat - Skeena
287 kV Transmission Line Project
RECREATION AND VISUAL ASSESSMENT

Figure 4: Type 3 Corridor – proposed line adjacent to existing 287 kV circuit and gas pipeline

Figure 5: Existing 287kV transmission line at Highway 25 crossing just north of the District of Kitimat (photo 5.33). The proposed line will be the same size and will use similar wooden structures.

4. *Visual/Recreation Impacts & Impact Management Strategies*

This chapter presents detailed, site-specific descriptions of the potential impacts of the proposed 287kV transmission line on visu and recreation resources in and near the proposed routes. Possib impact management strategies are also presented.

One common route, two alternative routes and a number of route options have been assessed. To facilitate description, each rout has been divided into segments with numbered nodes or endpoints.

This chapter is organized to correspond to these routes, segments and nodes. Each route is described in a separate section.

For each route, the discussion is arranged geographically from Kitimat Substation north to Skeena Substation. A brief descripti is followed by an impact summary table and then by annotated photographs of key sections of the route. Approximate distances in kilometres north from Kitimat Substation.

A foldout map that illustrates the routes can be found in the map pocket at the end of the report.

4.1 Preferred Route

From a visual and recreation perspective, Route A is preferred.

Concentration of utilities in the existing corridor means that th west side of the valley will remain a relatively untouched landscape, offering more potential opportunities for contrasting experiences as the valley as a whole develops.

Route A will have more impacts on existing, more highly used visu and recreation resources than Route B, although the impacts will incremental in most areas. It runs along the more developed side the valley where existing land uses are concentrated and is immediately adjacent to Highway 25 for much of its length. Howev much of it is parallel to an existing utility corridor containing transmission lines and natural gas pipelines.

Route B requires development of a new corridor in a relatively undisturbed landscape.

4.2 Route AB

The District of Kitimat sits at the head of Kitimat Arm, a fjord extending northeast from Douglas Channel. A generally flat valle about 5 kilometres wide extends north from Kitimat to Terrace, a distance of about 50 kilometres. Steep, forested mountainsides create sharply defined edges to the valley.

The proposed route crosses Highway 25 near Anderson Creek, runs north along steeply sloping, forested terrain for about 6 km, and then crosses the valley floor (Figures 6-11).

4.2.1 Visual and Recreation Impacts

The first 6 kilometres of this route traverse steeply sloping, forested terrain and could be quite visible from some sections of Highway 25, especially at the crossing near Anderson Creek (Figur 6). However, the line will likely be barely noticeable in most areas since the industrial facilities in the foreground are much more visually prominent (Figures 9 and 10). North of Kitimat Station, the line will be mostly hidden from view by trees (Figur 11).

There is little recreation use within this section of the corrido itself. However, the proposed line will cross the access road to Clague Mountain Municipal Park (Figure 11). The park provides opportunities for summer hiking and winter cross-country skiing a snowmobiling on the ridge above Kitimat. There are plans for par development and the District of Kitimat is building access roads. The line will cross the lower part of the access road near the existing line and there will be an incremental visual impact.

The proposed line will probably be visible from the Anderson Cree Falls viewpoint and swimming area (Figure 6).

The potential visual and recreation impacts of the proposed AB ro are summarized in Table 2 and illustrated in the photographs that follow.

ROUTE SEGMENT & NODES	VISUAL AND RECREATION IMPACTS ALONG ROUTE AB (1)					IMPACT MANAGEMENT STRATEGIES
	Dist. (Km) (2)	Area Name	Vis. Imp. (1)	Recr. Imp. (1)	DESCRIPTION OF IMPACTS	
AB 28-11/12	1	Anderson Falls	**	*	- partial foreground views where line will cross above local swimming area.	
	1-2		**	*	- foreground skyline views of structures on steep slopes above Hwy 37. - adjacent industrial facilities are far more visually prominent.	- locate line back from skyline silhouette positions or ridge
	2-8	Kitimat Station	*	*	- barely noticeable since industrial facilities in the foreground are much more prominent.	- use existing topography to minimize visibility
	7	Clague Mtn Municipal Park	**	**	- brief foreground views at crossing of access road	- cross road at right angles

NOTES:

(1) A three level rating scheme has been used to describe visual and recreation impacts:
- *** High
- ** Medium
- * Low / no impact

(2) Approximate distances in Kilometres north from Kitimat Substation along Route AB.

ROUTE AB Impact Summary

Kitimat - Skeena
287 kV Transmission Line Project
RECREATION AND VISUAL ASSESSMENT

Table 2: Visual & Recreation Impacts
Impact Management Strategies
Route AB

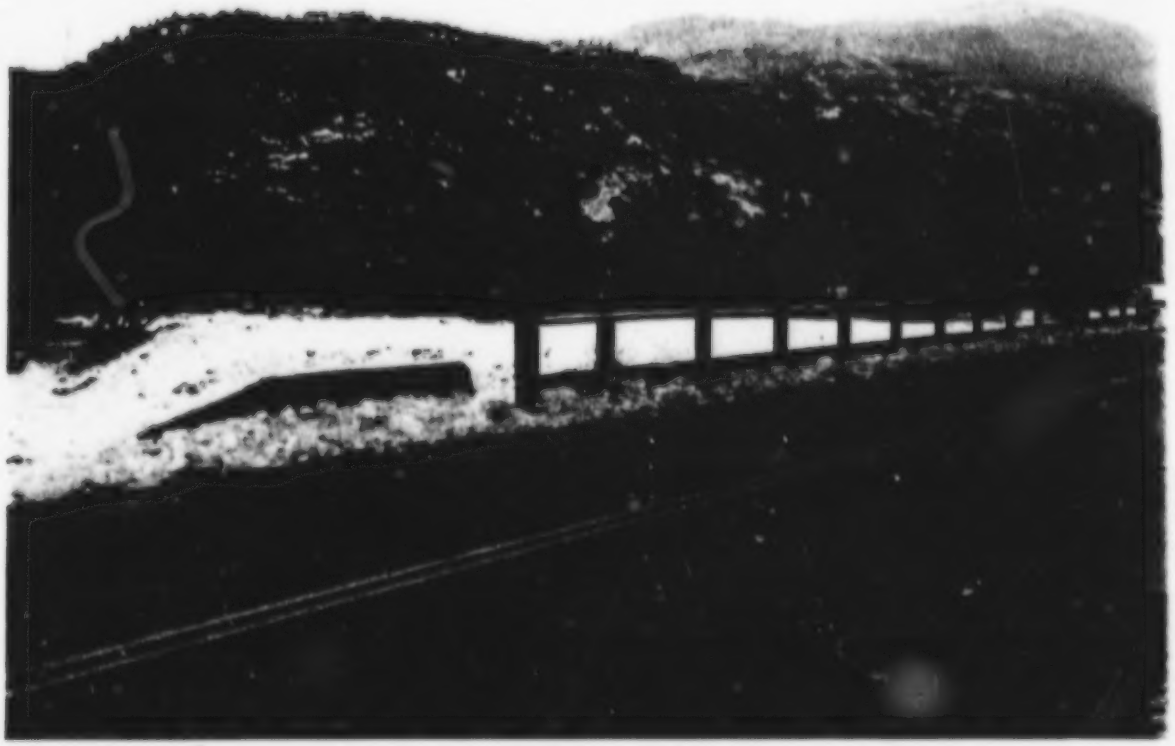


Figure 6: Km 1 Anderson Creek (photo 5.27)

View northwest towards forested hillside behind Kitimat Station area from Anderson Creek bridge on Highway 25. Anderson Creek Falls, a local swimming area, is just of the left side of the photograph. The existing 287kV line is in a prominent visual position as a skyline silhouette.

The proposed route is upslope behind the existing line. This section will probably be visible from the swimming area but may not be visible from the highway if it is located beyond the crest of the ridge.

Figure 7: Km 2 Eurocan Plant (photo 3.05)

Aerial view across steeply sloping hillsides south of Kitimat Station. The cleared corridor for the existing 287kV line is clearly visible in the foreground. However, the section of line across the next hillside is not visible because the corridor has not been cleared since the forest started to regenerate.

The proposed route is upslope to the right of the existing line and will be more visible. This section of the line would not be as visible from the valley if it were moved onto the bench to the right.

Figure 8: Km 3 Eurocan (photo 5.25)

View northwest towards existing transformer station and steep hillsides south of Kitimat Station. The wooden poles of the existing 287kV line are visible on the hillside. However, the line is barely visible through much of this area because the corridor has not been cleared since the forest started to regenerate.

The proposed route is further up the hillside and its cleared corridor will make it much more visible. However, minor alignment adjustments to take advantage the irregular terrain could reduce visibility.

Figure 9: Km 2 Eurocan Plant (photo 5.22)

View southwest towards Eurocan plant. The existing 287kV line is on the lower slopes of the mountain behind the plant and is virtually invisible from this area.

The proposed route is slightly upslope from the existing line. Its cleared corridor will be visible but barely noticeable.

Figure 10: Km 5 Kitimat Station Area (photo 5.28)

View west towards Kitimat Station area from Highway 25 near lower Kitimat River bridge. The existing 287kV line is on the lower slopes of the mountain but is barely visible.

The proposed route is upslope from the existing line. The cleared corridor will be visible but barely noticeable.

Figure 11: Km 8 Clague Mountain Municipal Park Area (photo 2.37)

Aerial view south towards forested valley floor and mountainside behind Kitimat Station. The existing cleared corridor is barely visible across the valley floor but increasingly visible as it climbs across the hillside. The access road to Clague Mountain Municipal Park is in the forest in the middle of the photograph.

The proposed route is to the immediate right of the existing line.

4.3 Route A

4.3.1 Visual and Recreation Impacts

Route A crosses the Kitimat River and then runs north along the base of the mountains on the east side of the valley.

The valley floor is generally flat and mostly carpeted with relatively young second growth coniferous forest. The active, braided channel of the Kitimat River occupies the southern half o the valley.

There are a number of areas with high sensitivities where visual and recreation impacts will be high (Table 3). These are areas where the line will be on highly visible sidehills above high use recreation areas or where it will parallel Highway 25 and be visible to highway travellers.

Very little recreation use occurs within the proposed corridor (t transmission line and the cleared zone within which it sits). However, most of the organized recreation in the area is accessed from Highway 25, which is immediately adjacent to the proposed route through much of its length. This means that the proposed line will be visible either from the approaches to the recreation areas or from the recreation areas themselves. The areas that wi be affected are:

- Kitimat River fishing access points	- foreground views from parking areas and river (Option 10-8)
- Lower Kitimat Bridge recreation site	- foreground views from parking area
- Onion Lakes Recreation Area	- foreground views from access road and parking lot
- Lakelse Lake area	- line on steep hillside above existing 287kV line, will be visible from parts of lake and numerous homes
- Mount Layton Resort	- very visible on steep slopes directly opposite resort
- Lakelse Lake Provincial Park	- foreground views from entry roa

Most of these impacts will be incremental since the proposed route parallels an existing transmission line.

4.3.2 Preferred Route Segments

From a visual and recreation perspective, the preferred combinati of segments is:

11-10 or 12-10
10-9-8
8-7
7-4-3-2-1

ROUTE SEGMENT & NODES	Dist. (Km) (2)	Area Name	Vis. Imp. (1)	Recr. Imp. (1)	DESCRIPTION OF IMPACTS	IMPA MANAGE STRATE
A1 11-10	8-16	Kitimat Valley Crossing	*	*	- not visible except at west side road crossing (km 10).	
12-10	8-16	Kitimat Valley Crossing	*	*	- not visible except at west side road crossing (km 10).	
A2 10-8	16-30	Humphreys Cr	***	**	- unobstructed foreground views from 13 km of Hwy 25 and from crossing at km 16.	
10-9-8	16-30	Humphreys Cr	**	**	- brief incremental unobstructed foreground views at Hwy 25 crossing (km 16). - partial midground views from Hwy 25	
A3 8-7	30-32	Kitimat River crossing	***	*	- directed, foreground and midground views of cleared corridor south of river from Hwy 25. - partially visible from Lower Kitimat Bridge Recreation Area.	- avoid stee slopes
	30-39	Onion Flats	***	*	- visible from Onion Flats parking lot. - unobstructed foreground views from approximately 5 km of Hwy 25.	
	44-52	Lakelse Lake	***	**	- line will traverse steep hillside above existing 287kV line and will be visible from Lakelse Lake and numerous homes. - unobstructed foreground views from Mount Layton Resort and from 9 km of Hwy 25. - Ministry of Forests staff have expressed concerns about visual impacts in this area - visible from access roads to Lakelse Lakes Provincial Park	- double-cir to avoid u clearing o switch to downslope of existin
		Mt Layton Res	***	***		
		Lakelse Lake Prov Park	***	*		
		Hatchery Cr	***	*		
		Furlong Cr	***	**		
A4 7-4-3-2-1	55	Hwy 25 crossing	**	*	- brief unobstructed foreground view at Hwy 25 crossing.	- cross road right angl
7-6-5-2-1	52	Hwy 25 crossing	**	*	- brief unobstructed foreground view Hwy 25 crossing.	- cross road right angl
7-6-3-2-1		Lakelse Lake Prov Park - Grouchy Beach	**	**	- partial filtered foreground views from Grouchy Beach entry & parking. - line will be immediately adjacent to Hwy 25 for approximately 4 km. - cleared corridor will be on sight-line of Hwy 25 northbound.	
		Sockeye Cr, Hwy 25	***	*		

(1). A three level rating scheme has been used for describing visual and recreation impacts:
- *** High
- ** Medium
- * Low / no impact

(2) Approximate distance in Kilometres north from Kitimat Substation along Route A.

ROUTE A

Impact Summary

Kitimat - Skeena
287 kV Transmission Line Project
RECREATION AND VISUAL ASSESSMENT

Table 3: Visual & Recreation Impacts
Impact Management Strategies
Route A

Figure 12: Km 16 Kitimat Valley Crossing (Photo 2.35)

Aerial view south along existing 287kV circuit towards Highway 25 crossing.

Option 11-10 is to the immediate right of the existing clearing and option 12-10 is to the immediate left.

Figure 13: Km 16 Kitimat Valley Crossing (photo 5.33)

View southwest to existing 287kV circuit at the Highwa 25 crossing.

Option 11-10 is to the right of the existing line and option 12-10 is to the left. There will be unobstruct foreground views as the line crosses the highway.

Figure 14: Km 26 Humphreys Creek (photo 2.34)

Aerial view south along existing 287kV line, Highway 2 and the Kitimat River. Fishing is a very popular activity in the Kitimat area and there are several fishing access points along this section of highway.

Option 10-8 is to the immediate left of the existing clearing and will be visible from the highway and fishing areas.

Option 10-9-8 is several hundred metres to the left an is in the forest along the left side of the photograph It will generally not be visible from the highway or river in this area.

Figure 15: Km 28 Humphreys Creek (photo 5.37E)

View south along Highway 25.

Option 10-8 is to the immediate left of the two existir lines and will be visible from about 13 km of Highway 25.

Option 10-9-8 is in the forest several hundred metres t the left and will generally not be visible except at th highway crossing at km 16.

Figure 16: Km 29 Humphreys Creek Area (photo 5.36)

View north along existing 287kV circuit from Highway 2

The cleared corridors of both options will be very visible as they cross the steep hillside in the centre of the photograph.

Figure 17: Km 32 Kitimat River Crossing (photo 2.30)

Aerial view south along the existing 287kV circuit towards steep hillsides near the Kitimat River crossing. The Lower Kitimat Bridge recreation area is just off the lower right corner of the photograph.

The proposed route is higher on the hillside and will l visible from the highway and from the recreation area.

Figure 18: Km 33 Kitimat River Crossing (photo 6.)

View south along Highway 25 towards the Kitimat River bridge. The cleared corridor for the existing 287kV line is visible on the hillside behind the bridge. The Lower Kitimat Bridge recreation area is to the right of the bridge.

The proposed route is to the left and above the existi corridor and will be very visible.

Figure 19: Km 32 Kitimat River Crossing (photo 6.)

View south towards Kitimat River crossing from Highway 25. The cleared corridor for the existing 287kV circu is clearly visible as it crosses the steep hillside in the centre of the photograph.

The proposed route is higher on the hillside and will b more visible.

Figure 20: Km 35 Onion Flats (photo 2.37)

Aerial view south along existing 287kV circuit and Highway 25 on Onion Flats.

The proposed route is to the immediate left of the existing line.

Figure 21: Km 35 Onion Flats (photo 6.)

View south along existing 287kV circuit from Highway 2

The proposed route is to the immediate left of the existing line and will be visible from the highway.

Figure 22: Km 44 Mount Layton Resort (photo 2.15)

Aerial view north towards Mount Layton Resort and Highway 25. The cleared corridor for the existing 287 line is visible on the hillside to the right.

The proposed line will be higher on the hillside to th right of the existing line.

Figure 23: Km 44 Mount Layton Resort (photo 7.)

View north towards entrance to Mount Layton Resort fro Highway 25. The existing 287kV circuit is on the hillside to the right.

The proposed line will be upslope immediately to the immediate right of the existing line and will be visib from the highway and from the resort.

Figure 24: Km 44 Mount Layton Resort (photo 6.)

View east towards hillside and existing 287kV line fro
entrance to Mount Layton Resort.

The proposed route is on the hillside immediately
upslope from the existing line.

Figure 25: Km 47 Hatchery Creek (photo 1.26)

Aerial view south along existing 287kV line towards Highway 25 near Hatchery Creek. Lakelse Lake Provinci Park is in the forested area to the right of the highway.

The proposed route is to the immediate left of the existing line.

Figure 26: Km 47 Hatchery Creek (photo 6.)

View south towards Hatchery Creek crossing from Highwa 25. The existing 287kV line is near the base of the slope on the left side of the photograph.

The proposed route is to the left of the existing lines. It will be very visible at the crest of the hill.

Figure 27: Km 46 Hatchery Creek (photo 6.)

View north towards Hatchery Creek crossing from Highwa
25. The two existing lines are clearly visible.

The proposed route will be to the immediate right of t
two existing lines and will be visible from the highwa

Figure 28: Km 46 Hatchery Creek (photo 1.08)

View east across Lakelse Lake to slopes above Hatchery Creek from Mailbox Point. The clearings for the existing 287kV line and recent timber harvesting are clearly visible on the left side of the photograph. Timber harvesting on Forceman Ridge is also clearly visible.

The proposed route is above the existing line on the left side of the photograph and will be more visible.

Figure 29: Km 46 Hatchery Creek (photo 7.)

View northeast along existing 287kV line from Highway 3 just north of Hatchery Creek. The existing 287kV line swings away from the highway and then climbs along the hillside south of Furlong Creek.

The proposed route is immediately right of the existing line. A short section of it will be screened from view by deciduous trees but it will become increasingly visible as it climbs the hillside.

Figure 30: Km 49 Furlong Creek (photo 7.)

View north along Highway 25 at Furlong Creek crossing. Two existing transmission lines are located beside the highway.

The proposed route will be to the right of the existin lines and will be very visible from the highway.

Figure 31: Km 50 Furlong Creek (photo 1.19)

Aerial view southeast towards Highway 25 and the slope north of Furlong Creek. The cleared corridor for the existing 287kV line is clearly visible. Lakelse Lake Provincial Park is to the right of the highway.

The proposed route will be on the steeply sloping hillside above the existing cleared area and will be very visible.

Figure 32: Km 50 Furlong Creek (photo 6.)

View southeast from Highway 25 towards slopes near Furlong Creek and the existing transmission line corridor.

The proposed route is above the existing line and will be very visible.

Figure 33: Km 54 Sockeye Creek (photo 1.18)

Aerial view south along Highway 25 and the existing 287kV corridor towards Lakelse Lake. The existing 287 line is immediately to the left of the highway.

Option 7-6-3-2-1 will be on the immediate left of the existing line and will be very visible from the highwa

Option 7-6-5-2-1 crosses the highway at the end of the tangent in the centre of the photograph.

Option 7-4-3-2-1- runs along the hillside beyond the left side of the photograph.

Figure 34: Km 55 Sockeye Creek (photo 6.)

View north towards existing 287kV corridor from Highwa 25.

Option 7-6-3-2-1 will result in widening the right sid of the clearing. This clearing is on a directed sight-line from the highway so it will be very visible

Figure 35: Km 59 Thunderbird Flats (photo 1.15)

Aerial view east across Thunderbird Flats and existing 500kV and 287kV transmission lines. Sockeye Creek is just over the edge of the terrace on the right side of the photograph.

The proposed line will be on the right side of the existing corridor. This section of the line will be screened by trees and will seldom be seen.

4.4 Route B

4.4.1 Visual and Recreation Impacts

Route B runs along the base of the mountains on the west side of the valley. Much of it crosses unsettled, forested land where th valley floor is generally flat and mostly carpeted with relativel young, second growth coniferous forest. There is active logging some areas. Access is limited to a network of forest access road

The generally flat terrain and dense forest cover restrict views from most areas giving terrace edges, hillsides and river edges greater value as viewpoints (e.g. Figure 37, the road near the Little Wedeene).

The proposed route will generally cross areas that have limited access and are seldom seen. It will not be visible from high use areas such as Lakelse Lake and Highway 25. However, it will be visible to hunters, fishermen and other recreationists using the forest access roads, although vegetation along the roads will restrict views in many areas.

The main impacts of the proposed B route will be:

- introduction of a cleared corridor and transmission line into a new area
- provision of better access
- reduction in aesthetic value of recreation near the corridor, especially at road and river crossings (e.g. Wedeene River, Figures 41 and 42).

These impacts are summarized in Table 4 and the photographs that follow.

4.4.2 Preferred Route Segments

From a recreation and visual perspective, the preferred combinati of segments is:

12-27
27-26-24
24-23-21-19-17-15
15-13
13-1.

ROUTE SEGMENT & NODES	VISUAL AND RECREATION IMPACTS ALONG ROUTE B (1) Dist. (Km) (2)	Area Name	Vis. Imp. (1)	Recr. Imp. (1)	DESCRIPTION OF IMPACTS	IMPACT MANAGEMENT STRATEGIES
B1 11/12-27	8-13		*	*	- line will generally not be visible.	
B2 27-25-24	13-17	Little Wedeene	*	*	- barely visible through trees.	
27-26-24			*	*	- barely visible through trees.	
27-24			**	*	- brief foreground views from road (km 14.5).	
B3 24-22-20-18-16-15	17-27	Wedeene Crossings	**	*	- foreground views of westside line from various sections of road.	- avoid steep sl above road.
24-22-20-18-17-15					- steep slopes that may be disturbed will be very visible.	
24-22-20-19-17-15						
24-22-21-19-17-15						
24-23-21-19-17-15	17-27	Iron Mtn.	*	*	- brief foreground views at road crossing (km 17).	- cross road at right angle.
B4 14-13	31-35	West Lake	**	*	- foreground views where line will parallel road for 4 km.	- avoid parallel road
15-13	29,32, 36,38		**	*	- brief foreground views where line will cross road at 4 locations.	
16-14			*	*	- not visible.	
B5 13-1	46	Lakelse R Crossing	**	**	- brief foreground views where line will cross river.	- cross river at right angle.

NOTES:

(1). A three level rating scheme has been used for describing visual and recreation impacts:

*** High

** Medium

* Low / no impact

(2) Approximate distance (Km) north from Kitimat Substation along Route B.

ROUTE B

Impact

Summary

Kitimat - Skeena

287 kV Transmission Line Project

RECREATION AND VISUAL ASSESSMENT

Table 4: Visual & Recreation Impacts
Impact Management Strategies
Route B

Figure 36: Km 15 Little Wedeene (photo 5.11)

View northwest towards Little Wedeene River from fores access road.

The proposed route is along the base of the mountains the centre of the photograph.

Figure 37: Km 15 Little Wedeene (photo 5.10)

View southeast across lower Kitimat River valley from terrace just north of the Little Wedeene River. This type of flat, forested terrain, typical of many areas along the west side of the valley, offers limited opportunities for long distance views.

Figure 38: Km 18 Little Wedeene-Wedeene Area (photo 5.05)

View west across irregular terrain north of the little Wedeene.

The proposed route is along the edge of the valley flo at the base of the mountains and is hidden from view.

Figure 39: Km 21 Wedeene River (photo 3.20)

Aerial view north up the Wedeene River. The forest access road is on the left side of the river and the railroad is on the right. The steep, erodable slopes are in the left central part of the photograph.

There are numerous route options in this area. Option 24-22-21 crosses just upriver.

Figure 40: Km 27 Wedeene River (photo A1.28)

Aerial view south down the Wedeene River just downstre from Wedeene valley. The forest access road is just o the photo to the right and the railroad is to the left The steep, erodable slopes are on the right side of th photograph.

There are numerous route options in this area. Option 22-20-19 crosses in the centre of the photograph. Option 22-20-18 runs along the right hand side and crosses just below the camera location.

Figure 41: Km 22 Wedeene River (photo 4.34)

View northwest up the Wedeene River from the forest access road.

There are numerous route options in this area. Option 22-20-18 runs along the edge of the steep slopes on th left side of the photograph. Option 22-20-19 crosses about 1.5 km upstream.

Figure 42: Km 22 Wedeene River (photo A1.28)

View east across Wedeene River to slopes of Iron Mountain.

Option 32-31-19 runs across the cleared area near the base of the slope. Option 22-21-19 crosses at about this location.

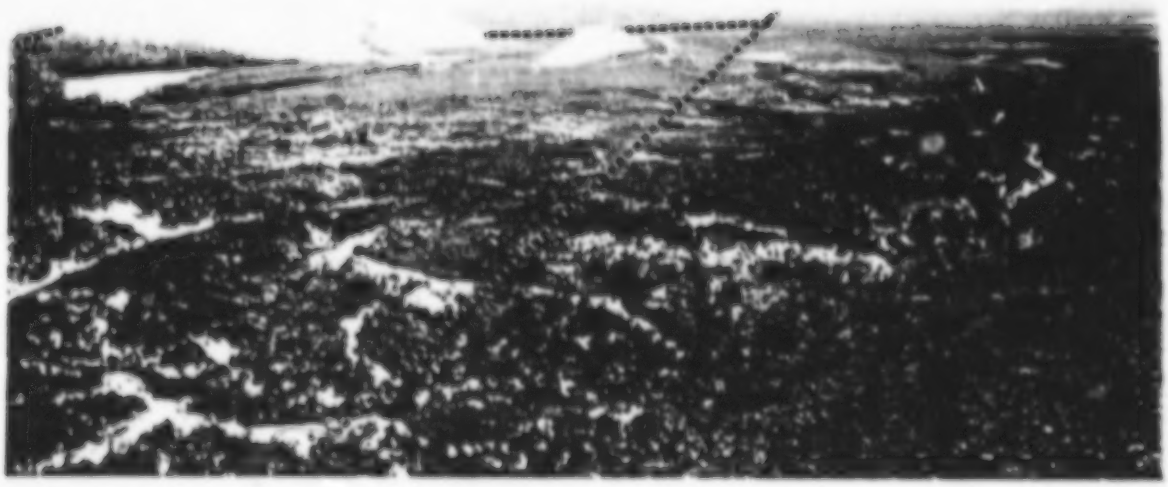


Figure 43: Km 28 Lone Wolf Creek (photo 3.24)

Aerial view north along west side of Onion Flats. Lon
Wolf Creek is on the extreme left side of the photograph. The forest access road and railroad go between the two white hills in the centre of the photograph.

Option 15-13 goes to the right of the smaller white hill. Option 15-14-13 goes to the left of the larger white hill.

Figure 44: Km 37 Coldwater River Valley (photo 4.13)

View northeast toward Coldwater Creek valley.

Both route options run along the base of the mountains at edge of the valley floor and pass to the right of t hill in the centre of the photograph. The trees in th valley will screen the lines from view.

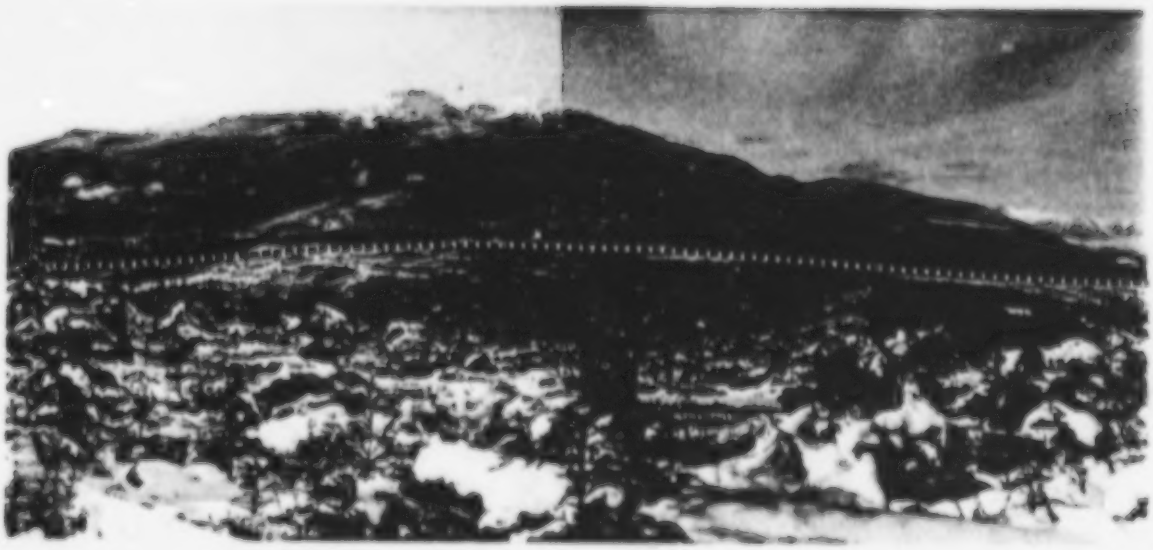


Figure 45: Km 41 (photo 4.20, 4.21)

View west across recently harvested area to mountains south of Lakelse River.

The proposed route runs across the upper edge of the cleared area. It will be visible until the trees grow although it will seldom be seen because access to this area is poor.

Figure 46: Km 42 (photo 4.22)

View northwest across irregular terrain south of Lakel River.

The proposed route will be barely visible as it crosse this terrain. It will seldom be seen since access to the area is limited to a few rough forest access roads

Figure 47: Km 51 Skeena Substation (photo 1.13)

Aerial view southwest from Skeena Substation.

The proposed route crosses generally flat forested lan that is relatively inaccessible so it will seldom be seen.

5. *Appendices*

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Appendix 1: REFERENCES

B.C. Hydro & Power Authority
1989 Kitimat-Skeena Project Information

Blair, W.G.E.
1983 "The US Practice of Visual Resource Management". Garte + Landschaft. 8/83:607.

Blair, W.G.E.
1980 "Visual Resource Management." Environmental Comment June:6-16. Washington D.C.: Urban Land Institute.

Durante & Partners
1990 Visual and Recreation Assessment for Williston-Kelly Lake 500kV Transmission Line. Report prepared for B.C Hydro.

Government of B.C.
n.d. Kitimat - Terrace Study: Recreation Capability. (2 maps at 1:50,000 scale). Victoria: Geographic Division, Environment and Land Use Committee Secretariat.

Kerby, N.
1984 Background Studies and Planning Recommendations: Great Terrace Official Settlement Plan. Terrace: Regional District of Kitimat-Stikine.

Litton, R.B.
1973 "Landscape Control Points: A Procedure for Predicting and Monitoring Visual Impacts", USDA Forest Science, Research Paper PSW - 91. Washington D.C.

Lynch, K.
1960 Image of the City, Cambridge MA: The MIT Press.

Murray B.H. and B.J. Niemann Jr.
1979 "Proceedings of Our National Landscape: Conference on Applied Techniques for Analysis and Management of the Visual Resource." USDA Forest Service, General Technical Report PSW - 35. Washington D.C.: U.S. Government Printing Office.

Norecol Environmental Consultants Ltd
1990 Visual and Recreation Assessment for Windy Craggy Mine Access Road. Stage 1 Submission to B.C. Mine Development Steering Committee. Vancouver, B.C.

Stone, E.H.
1978 "Visual Resource Management," LATIS 1:2

USDA, Forest Service
1974 "National Forest Landscape Management, 2:1, The Visual Management System," Agriculture Handbook 462. Washingtc D.C.

USDA, Forest Science
1973 "National Forest Landscape Management, Volume 1," Agriculture Handbook 434. Washington D.C.

Yeomans, W.C.
1983 "Visual Resource Assessment: A User Guide." MOE Manus 2. Victoria, B.C.: B.C. Ministry of Environment.

Appendix 2: PERSONS CONTACTED

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Appendix 3: VISUAL MANAGEMENT CONCEPTS

Views, vistas and beautiful places have been a source of inspriation for centuries. People have always responded to the visual qualities of their surroundings, in fact, more than 80% o our knowledge about the world around us comes through our eyes.

The visual qualities of landscape are of such economic importanc today that the value of landscape aesthetics has even been quantified and marketed. View properties have much greater valu than those without views. Real estate advertisements trumpet th "panoramic mountain view" and even promote the "peek-a-boo view".

Visual assessment studies seek to determine and describe the probable visual effects of proposed changes to an area. The fundamental assumption of visual assessment is that areas that a seen at close range by numerous observers are more sensitive thar those that are seldom seen.

Recreation assessments seek to determine and describe the direct and indirect effects of proposed changes on recreational activiti within an area. Visual and recreation assessments are often conducted simultaneously since many visual impacts affect recreation activities such as hunting, hiking and photography.

Analysis and management of visual resources is a complex discipline. The United States Forest Service and the United Stat Bureau of Land Management have prepared a series of handbooks tha outline visual management processes for lands under their jurisdiction (USDA 1973, 1974). Similar handbooks have been prepared by the B.C. Ministry of Forests (1981) and the B.C. Ministry of Environment (Yeomans 1983).

The multitude of methods and handbooks confirms that no one metho will work for all situations. However, most methods are based on the concept of minimizing contrasts, minimizing things in the landscape that will attract attention.

Visual sensitivity, a measure of the degree of sensitivity to visual change, is a complex phenomenon based on the physical character of an area, the nature of the proposed changes and the perceptual characteristics of the observers. Visual sensitivity can also be described as Visual Absorption Capability or VAC, a measure of the ability of the landscape to absorb disturbance without significantly altering its visual character (Yeomans 1974 BCFS 1981).

Appendix 4: GLOSSARY OF TERMS

Some of the key concepts and terms used in describing visual and recreation impacts are listed below.

Background (BG):
- more than 5 km from the proposed line.
- the distant landscape where detail is lost and the visual emphasis is on outlines, edg and large landforms such as mountains.

Corridor:
- the cleared area for a linear facility such as an electric transmission line or gas pipeline.

Distance Zones:
- within the viewshed, distance from the line is a key determinant of the severity of impact.
- Something seen at a distance is much less apparent than something seen at close range
- Most visual assessment studies define three distance zones: foreground (FG), midground (MG) and background (BG).

Existing Corridor:
- the cleared area for existing linear facilities such as transmission lines.

Foreground (FG):
- less than 500 m from the proposed line.
- the landscape very close to the observer where detail in colour and texture is most important.

Midground (MG):
- from 500 m to 5 km from the proposed line.

Proposed Alignment:
- the centreline of the proposed transmission line.

Proposed Corridor:
- the cleared area for existing and/or propos transmission lines.
- this is often the dominant landscape featur of transmission lines in forested areas, especially when seen from a distance.
- in most cases the corridor will be wider th the right of way, depending on slope, tree height and other factors.

Proposed Line:
- the towers and conductors of the proposed transmission line.

(cont'

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Transmission Line Right of Way: The legally defined zone within which a transmission line is located.

Viewshed:
- the area from which a proposed development could be seen.
- areas from which the development will not b visible are outside the viewshed.
- the viewshed is usually divided into three distance zones: foreground, midground and background.

Visual Sensitivity:
- a measure of the degree of sensitivity to visual change.
- a complex phenomenon based on the physical character of an area, the type of proposed changes and the perceptual characteristics the observers.

MAPS
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